

REMARKS

By this amendment, Applicants have amended the claims to more clearly define their invention. In particular, claim 1 has been amended to include therein the limitation previously recited in dependent claim 27, i.e., that there is a line directly connecting zone Z3 to zone Z5 for transferring the solid phase. In addition, claim 1 has been amended to clarify that the fluidized beds in zone Z1 and zone Z3 are fluidized beds of the heat-carrying solid. Claim 1 has been amended to clarify that the solid phase coming from zone Z3 to zone Z5 comprises solid residue not converted into synthesis gas and spent heat-carrying solid. Claim 27 has been canceled without prejudice or disclaimer and new claim 28 added to define the material of which the heat-carrying solid can be made, as noted in the third paragraph on page 6 and the second full paragraph on page 8 of Applicants' specification. The foregoing amendments to claim 1 are supported by, e.g., Figure 1 and the description thereof in Applicants' specification, as well as by Figure 2 and the description thereof in Applicants' specification.

Applicants, through their undersigned attorney, thank the Examiner for the interview conducted between the Examiner and the undersigned on March 17, 2010. During the interview, the undersigned described the differences between the present invention and U.S. Patent No. 4,322,222 to Sass. In addition, the undersigned proposed the foregoing amendments to clarify aspects of the present invention. The Examiner indicated the amendments appear to overcome the rejections of record, but indicated that further consideration would be given after a formal response is filed.

Since the foregoing amendments merely amend claim 1 to include therein the limitation previously recited in dependent claim 27 and clarify aspects of the

invention defined in claim 1, it is submitted the foregoing amendments do not raise new issues requiring further consideration and/or search. Moreover, while the amendment adds a new dependent claim (claim 28), it cancels a corresponding number (1) of claims (i.e., the cancellation of claim 27). In addition, the amendment places the application in condition for allowance for the reasons set forth hereinafter. Therefore, entry of this Amendment under 37 CFR 1.116 is requested.

In view of the cancellation of claim 27, the rejection of claim 27 under 35 U.S.C. 112, second paragraph, and the objection to claim 27 in numbered section 3 of the Office Action are moot. It is submitted the rejection and objection do not apply to claim 1, or any of the other claims, as presently amended.

Claims 1-4, 7-9, 20, 21 and 24-26 stand rejected under 35 U.S.C. 102(b) as allegedly being anticipated by U.S. Patent No. 4,322,222 to Sass. Claims 6 and 23 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Sass. Applicants traverse these rejections and request reconsideration thereof.

The presently claimed invention is directed to a facility for producing synthesis gas from a solid feedstock including organic matter, the facility including means for circulating a heat-carrying solid providing at least some of the heat necessary for such production, a zone Z1 including pyrolysis and gasification means, a zone Z2 including separation means, a line for supplying gaseous and solid effluents from zone Z1 to zone Z2, a zone Z3 including gasification means, a zone Z4 including separation means, and a zone Z5 including combustion means.

According to the present invention:

- the zone Z1 has means for pyrolysis and gasification of the feedstock in a transported fluidized bed of the heat-carrying solid,

- the zone Z2 has means for at least partial separation of the effluents from zone Z1 into an essentially gaseous phase and into an essentially solid phase comprising solid residue and heat-carrying solid,,
- the zone Z3 is supplied at least in part with the essentially solid phase and includes dense fluidized bed of the heat-carrying solid for gasification of solid residue of the essentially solid phase, and
- the zone Z4 includes means for separating the effluents coming from zone Z3 into an a synthesis gas and into an entrained solid phase,
- the zone Z5 includes means for combusting a solid phase comprising solid residue not converted into synthesis gas and spent heat-carrying solid, coming from zone Z3 through a line directly connecting zone 23 to zone 25, and means for transferring the heat-carrying solid coming from the combustion into zone Z1.

The Sass patent discloses, inter alia, that carbonaceous material is gasified in a first pyrolysis zone substantially in an absence of free oxygen by heating with a solid heating media. The carbonaceous material is conducted through the first pyrolysis zone in turbulent flow to provide for the rapid transfer of heat to effect the gasification. Gaseous products are recovered while char products are introduced into a second pyrolysis zone for additional gasification. The second pyrolysis zone is maintained substantially free of free oxygen. Gasification in the second pyrolysis zone is effected by the transfer of heat from a heating media to the char products produced in the first pyrolysis zone. Gaseous products from the second pyrolysis zone are recovered. The char products from the second pyrolysis zone can be heated to a temperature sufficient for use as a solid heating media.

However, the Sass patent does not disclose a number of claimed features of the facility of the present invention. For example, according to the presently claimed invention, the zone Z1 has means for pyrolysis and gasification of the feedstock in a transported fluidized bed of the heat-carrying solid. The phrase “transported fluidized bed” is defined at page 7, lines 21-25 of Applicants’ specification as meaning “that the rise rate of the gas is, measured by the ratio between the flowrate of the carrier gas introduced and the cross section of the reactor, is greater than the terminal sink rate in the reactor of the fraction of particles with the largest diameter.” The Sass patent does not disclose that the first stage pyrolysis reactor 22 comprises a transported fluidized bed of the heat-carrying solid.

In addition, according to the presently claimed invention, the zone Z3 includes dense fluidized bed of the heat-carrying solid for gasification of the essentially solid phase. As defined at page 11, lines 2-6 of Applicants’ specification, “dense fluidized bed” means “a bed of dense particles for which the superficial velocity of the gaseous in the reactor is less than the terminal drop velocity in the reactor of the fraction of particles with the largest diameter but greater than the superficial velocity of the gas needed to achieve sufficient fluidization of the bed.” The Sass patent does not disclose that the second stage pyrolysis reactor 38 includes a dense fluidized bed of the heat-carrying solid.

Moreover, the Sass patent does not disclose a line directly connecting the second stage pyrolysis reactor 38 to the char furnace 68. Therefore, the Sass patent does not disclose a line directly connecting zone Z3 to zone Z5 for transferring a solid phase comprising solid residue not converted into synthesis gas and spent heat-carrying solid. Rather, the char furnace 68 receives char from separator 50

(which the Examiner equates to zone Z4) by the line 62; the furnace 68 does not receive char directly from the second stage pyrolysis reactor 38.

For the foregoing reasons, the presently claimed invention is patentable over Sass.

Claims 5 and 22 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Sass in view of U.S. Patent No. 4,347,064 to Reh et al. Applicants traverse this rejection and request reconsideration thereof.

The Examiner has cited the Reh et al. patent as allegedly teaching that gaseous effluent from a pyrolysis reactor is sent through two cyclone separators in order to provide a more thorough separation of the solid and the gaseous. However, clearly nothing in Reh et al. would have remedied the basis deficiencies noted above with respect to Sass. Accordingly, claims 5 and 22 are patentable over the proposed combination of patents, at least for the reasons noted above.

Claim 27 stands rejected under 35 U.S.C. 103(a) as being unpatentable over Sass in view of U.S. Patent No. 3,998,607 to Wesselhoff et al. Applicants traverse this rejection and request reconsideration thereof, at least insofar it applies to claim 1 as presently amended.

The Wesselhoff et al. patent discloses an alkaline metal catalyst recovery process and has been cited by the Examiner for its teachings with respect to the various conduits for carrying solids. However, it is submitted the teachings of Sass and Wesselhoff et al. would not have rendered obvious the presently claimed facility, including the fluidized beds of heat-carrying solid and the various connections there between.

Accordingly, the presently claimed invention is patentable over the proposed combination of Sass and Wesselhoff et al.

In view of the foregoing amendments and remarks, entry of this amendment and favorable reconsideration and allowance of all the claims now in the application are requested.

To the extent necessary, applicants petition for an extension of time under 37 CFR 1.136. Please charge any shortage in the fees due in connection with the filing of this paper, including extension of time fees, to the deposit account of Antonelli, Terry, Stout & Kraus, LLP, Deposit Account No. 01-2135 (Case: 612.43484X00), and please credit any excess fees to such deposit account.

Respectfully submitted,

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